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# The Migration-Commuting Nexus in Rural England:

## A Longitudinal Analysis<sup>1</sup>

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### Introduction

Migration and commuting are the two main forms of internal population mobility within nation states. Migration is a permanent or semi-permanent change of residence of sufficient duration and distance to interrupt everyday activity patterns (Long 1988). Commuting, in contrast, is a form of population circulation that typically involves a daily journey between a permanent residence and a fixed workplace (Green 2004).<sup>2</sup> While the rate of internal migration tends to fluctuate in response to the business cycle and other social and economic circumstances, in the UK on average about one in ten people have changed residence annually during the last 35 years, indicating that change of residence is fairly common (Champion 2014). This is particularly true in comparison with other EU countries such as France or Germany where residential change is less common (International Organization for Migration 2013; Clark and Drever 2000). Similarly, while working at home has increased recently (to about 10% in England), the vast majority of workers in England and Wales commute to jobs outside of their homes (ONS 2014).

Internal migration and commuting are often examined separately with the implicit assumption that they are independent forms of geographic mobility. However, some researchers see these two spatial processes as interrelated, and have identified the so called “migration-commuting nexus” (Sandow and Westin 2010). A main question motivating research on this nexus concerns the extent to

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<sup>1</sup> An earlier version of this paper was presented at the annual meeting of the Population Association of America, April 1, 2015, San Diego, California.

<sup>2</sup> Commuting typically involves a daily journey to work, but can also involve longer duration, albeit temporary, trips between permanent residence and a fixed workplace.

which migration can be a substitute for commuting, or vice versa. For example, Sandow and Westin (2010) contend that longer distance commuting has replaced much internal migration in Sweden, becoming more prevalent because of enhanced transportation and communication infrastructure, housing restrictions in urban areas, and residential preferences for lower density areas. The difficulties which dual worker families often encounter in finding an optimal residential location for both workers is also thought to make longer distance commuting, at least by one spouse, more acceptable. According to Green (1999), some families engage in long distance weekly commuting in lieu of migrating even though such arrangements were shown to place the “stay at home spouse” at an economic and social disadvantage.

Understanding how migration and commuting might substitute for each other is an important research question, but this paper’s focus is somewhat different. Rather than considering the potential substitutability of these two forms of internal population movement, this research examines the commuting behavior of workers who have recently moved to or within rural England. This is an important question because the drivers of moves from the city to the countryside, or within the countryside, are generally considered to be consumption-related, e.g., motivated by amenities and perceived community attributes associated with quality of life rather than by employment-related concerns. As Champion (2001:45) observed, urban-rural migration has persisted in Britain because of the British people’s “love affair with the countryside” which he contends has been reinforced by planning policies of urban containment. Hence, workers who move from the city to the countryside, or within the countryside, for amenity reasons might be expected to tolerate a longer commute in return for a perceived enhancement of their quality of life. Similar to the short distance intra-city consumption-related moves researched by Green (2004), urban to rural and rural to rural migrations are not necessarily accompanied by workplace moves, suggesting that many people who are employed both before and after migrating commute back to their pre-migration workplaces. Partridge et al., (2010)

report findings supporting this position in Canada, e.g., when persons move to rural areas for lifestyle reasons, they tend to retain their urban employment. This expectation is generally consistent with previous research, although as will be discussed below, such research has used cross sectional data, and hence is unable to directly examine whether such migrants retain or switch their workplaces subsequent to moving.<sup>3</sup> Trading off increased commuting time for perceived enhancements of quality of life is also consistent with the notion of “commuting time tolerance.” In a study of Lisbon, Portugal, for example, Vale (2013) found that employees tended to retain their previous residences after their employers moved production facilities into central city development zones.<sup>4</sup> Similarly, Romani and his colleagues (2003) showed that Catalan workers who migrated to a new municipality were more likely to commute outside of their residence sub-region than workers who were residentially stable. They explain this by noting that persons who moved to the suburbs for consumption reasons typically commute back to central city jobs. In other words, urban to suburban migration resulted in longer commutes. The authors pointed out that this finding is at variance with the conventional theory of urban land use change proposed by Alonso (1964) that workers typically change their residence in order to minimize their journey to work.

The present authors agree that the persistence of longer distance commuting among persons who might otherwise be expected to reduce their journey to work through migration is an important focus of research, but it is not the same as examining the actual commuting behavior of persons who have *already migrated*, especially workers who migrate from urban to rural areas. Rural England is experiencing a significant amount of internal migration among rural areas as well as from urban to rural areas (ONS 2013). This has placed many rural migrants far from their pre-migration jobs. Accordingly,

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<sup>3</sup> Similarly, the present authors believe that migration between different rural places is not typically associated with a change of workplace.

<sup>4</sup> Although they might change the mode of transportation.

this paper examines the commuting behavior of recent migrants living in rural areas. The following interrelated questions are investigated:

1. Do rural workers who move from urban to rural areas, or among places within rural regions, commute farther than rural workers who are stayers?
  - a. If so, can this association between migration and commuting distance be explained by controlling for other attributes of rural workers that are associated with commuting distance?
2. Are rural workers who move from urban to rural areas, or among places within rural regions, more likely to change their commuting distance subsequent to moving compared with rural workers who are stayers?
  - a. If so, is retaining or changing one's commuting distance subsequent to moving associated with one's commuting distance prior to moving?
  - b. What attributes of workers, other than initial commuting distance, are associated with the likelihood of increasing or decreasing one's commuting distance?
3. Do workers residing in rural areas who change their commuting distance do so by changing workplace, residence, or both?

Little research to date has directly examined these questions. This paper seeks to fill this gap by analyzing a longitudinal data file that includes annual information on place of residence and place of work in England from 2002 through 2006.

Our analysis of these questions is organized in three main sections. First we briefly review previous research on migration and commuting and indicate how conducting a longitudinal study with panel data

can be expected to add to current knowledge. Next we discuss our research strategy introducing the ASHE data set, our definitions of migration and commuting, and our statistical approach. The data analysis that follows examines our three research questions as indicated above.

## **Background**

### Geographic Mobility and Changing Settlement Structure:

Both migration and commuting contribute to what Castells (2000) has characterized as a ‘world of flows’ that is characterized by a heightened movement of labor, population, information, capital, ideas and objects. Spatially-oriented social scientists refer to this perspective as the ‘mobilities paradigm.’ Urry (2007) coined this term to call attention to the increased levels of mobility, and new forms of mobility, that structure today’s increasingly interdependent world. The mobilities paradigm includes ‘movements of people, objects, capital, and information across the world, as well as more local processes of daily transportation, movement through public and private spaces, and the travel of material things in everyday life’ (Urry 2007:6). The mobilities paradigm ‘connects the analysis of different forms of travel, transport, and communication with the multiple ways in which economic and social life is performed and organized through time and various spaces.’ (Urry 2007:6)<sup>5</sup> In this article, we are interested in population mobility and especially in the migration and commuting that occurs between urban and rural England as well as within the rural sector itself.

Rural Migration: Champion (2013) showed that even though urban and rural areas of the UK grew by approximately the same rate between 2001 and 2011, the net direction of internal migration has continued to favor rural areas, albeit at a lower rate during 2007-2012 than between 2001 and

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<sup>5</sup> It should be noted that several researchers have determined that the rate of internal migration has declined significantly since around 1990 in more developed nations. (see Molloy et al. 2013 for a review)

2007.<sup>6</sup> In addition, data from ONS indicate that almost 900,000 persons moved within the rural sector itself during 2012. While many of these persons left rural areas for urban destinations, fully 45.6 percent moved from one rural area to another (ONS 2013). These migration patterns affect the journey to work because internal migration is selective of working age persons. According to Champion (2014), net urban to rural migration is especially pronounced during the prime working ages (30-44), and before age 16. These age groups include persons with the highest rates of labor force participation and their children. Hence, both urban-rural and rural-rural migration have the potential of separating many working age rural residents from their pre-migration workplaces thereby resulting in longer journeys to work or, alternatively, moving work closer to their new residence.

The Migration-Commuting Nexus: Journey to work distance is rising in the UK and in most other more developed nations (ONS 2014; Frost 2006; U.S. Bureau of the Census 2009). For example, analysis of the 2001 and 2011 UK censuses shows the average journey to work increasing from 13.4 km to 15 km over the decade (ONS 2014). Moreover, when internal migration and commuting are experienced by the same persons, the likely result is a higher degree of interpenetration between origin and destination communities. In other words, migrants who commute back to their pre-migration jobs have their feet in two social worlds. Accordingly, rather than separating origin and destination communities, one might argue that the nexus between internal migration and commuting produces new social and economic relationships among rural areas and between them and their urban counterparts.

Previous research on the nexus of internal migration and commuting:

While research demonstrates that rural workers commute farther than their urban counterparts (Champion 2009; Boyle et al., 2001; Frost 2006; Coombes and Raybould 2002; Green and Owen 2006),

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<sup>6</sup> Champion (2013) examined the components of population change experienced by urban and rural areas in England between 2001 and 2011, and showed that rural-urban equality in overall population growth rates during this time is a result of net internal migration from urban to rural destinations being offset by differentially higher natural increase and international migration rates in urban areas.

and that urban-rural migrants commute farther than established rural residents (Green 1999; Schindegger and Krajasits' 1997; Findlay et al., 2001; Boyle et al., 2001; Champion et al., 2009; Axisa, et al., 2012a, 2012b), the interrelationship between rural to rural or urban to rural migration and commuting is not well understood. We have been able to identify only a few studies that examine the commuting behavior of recent rural in-migrants in the UK and Canada, and we are not aware of similar studies conducted elsewhere. Each of these studies uses cross sectional data. We know of no longitudinal studies that *directly* examine changes in residence and subsequent changes (or lack thereof) of place of work.

Green (1999) conducted interviews with members of in-migrant households in the rural English Midlands and concluded that in-migrants who plan to maintain their previous occupational level must be prepared for longer distance commutes. Otherwise, they must expect to “trade down” to the lower skill jobs available locally. This finding is consistent with Schindegger and Krajasits' (1997) observation that a relatively high prevalence of long distance commuting among rural residents is associated with a lack of job opportunities sufficient to fully utilize the resident workforce. Findlay et al., (2001) conducted a survey on commuting behavior of in-migrants, local movers, and longer term residents of five areas of rural England. They reported that 45 pct. of in-migrants travelled at least 15 km to work compared with 28 pct. of longer term residents of the areas. Boyle et al., (2001) used micro data from the 1991 UK Census to conduct a nationwide study of migration (changing residence during the previous 12 months) and longer distance commuting (30 km or more). They found that being a recent in-migrant significantly increased the likelihood of travelling 30 km or more to work. Longer distance commuting characterized in-migrants to both urban and rural areas in comparison with longer term residents of such areas.

More recently, research on the interaction of internal migration and commuting has been conducted on rural England by Champion et al., (2009), and on the Toronto, Canada commuter shed by

Axisa et al., (2012a; 2012b). In addition to examining whether migrants were more likely than non-migrants to be longer distance commuters, these studies extended previous research by asking whether longer distance commuting varied in response to distance migrated and/or type of origin area left behind by migrants. Not surprisingly given previous research, both the Axisa and Champion studies reported that *recent* in-migrants commute farther than established residents ('stayers'). Champion et al., (2009) used the Controlled Access Microdata Sample (CAMS) of the 2001 Census of England, and found that workers who had moved home by 5 km or more into a rural settlement in the pre-census year are about twice as likely to commute 20 km or farther to their workplace compared with non-migrants. Axisa et al., (2012) used data from the 2006 Canadian Census and showed that recent rural migrants to Toronto have longer commutes than longer term Toronto residents.

Champion et al., (2009) also found that, compared with rural stayers, migrants who had moved 15-99 km were over twice as likely to be longer distance commuters after their change of home address, but the positive effect of migration distance on commuting distance diminished for in-migrants who moved 100 km or more. In other words, there appears to be a threshold after which some recent in-migrants may begin to obtain jobs closer to home in their new rural communities. Axisa et al., (2012a) report a similar finding in Canada. Mean commuting distance increased until migrants moved 90 km., after which it declined. Hence, these studies provide convincing evidence that many recent in-migrants to both rural and urban areas are longer distance commuters. As suggested earlier, they might be considered to be 'marginal people' (Park 1969), with a foot in two social and economic worlds. Or, considered in a more positive light, they may be community integrators; persons who split their daily activities between two different rural places or between urban and rural places.

Moving the Agenda Forward with a Longitudinal Approach:

While previous research has advanced knowledge about the interaction of internal migration and commuting, these studies were limited by the lack of longitudinal data that include information on place of residence and place of work at several points in time. For instance, in relation to the Champion et al., (2009) study, the UK Census' definition of migration as being a change of usual residence occurring at some time between one day and 12 months prior to the census is problematic. How many of these moves actually stick or are quickly reversed? Is it reasonable to expect that such recent in-movers would be able to adjust their place of work in such a short time? And, among persons who become long distance commuters subsequent to an urban to rural move, how many make a subsequent change of either workplace or home address that increases or decreases their commuting distance? Interestingly, Axisa et al., (2012a and 2012b) had data both on migration that occurred during the preceding year and on migration that occurred between 1 and 5 years ago, and found that as residential duration increases, commuting distance decreases. Still, this is cross sectional data, and only provides indirect, speculative evidence that migrants adjust their workplace location over time in their new residential location.

The act of changing one's workplace subsequent to moving is an inherently time varying phenomenon which can only be satisfactorily examined with longitudinal data.<sup>7</sup> Champion et al., (2009), for example, were only able to correlate whether working age respondents to the 2001 UK Census who moved from an urban to a rural area sometime within the year prior to the census, and who work at least 5 km from their homes, also commute a relatively long distance to their jobs. In other words, it is not possible with this or any cross sectional data to examine whether rural in-movers retain their pre-migration jobs, or change their workplace to be closer to their new residence. It may be plausible to

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<sup>7</sup> Having longitudinal data is the gold standard for examining time varying phenomena such as migration and changing job location, but Champion et al (2009) could have gained some additional empirical evidence about the coincidence of urban-rural migration and workplace change if the UK Census had provided *place of work one year ago*. But the Census didn't do that, so it was not possible for them to tell whether people changed workplace at the same time as moving home.

interpret the cross sectional findings as showing that long distance rural in-movers are likely to retain their pre-migration jobs, but is this what actually happens? Developing longitudinal research on migration-commuting interaction will provide a theoretically-shaped and evidence-based framework for understanding the roles of migration and commuting in producing the evolving structure of regions, including in the urban-rural interface, and a more solid basis for forming regional development policies in the future (Partridge et al., 2010).

### **Data and Analytical Strategy**

#### The ASHE Data Set: Its Advantages and Limitations:

As indicated above, longitudinal research on the migration-commuting nexus between urban and rural areas, and among rural areas, can advance our knowledge of geographic mobility in ways that are not possible using comparative cross sectional analysis. Hence, advancing this research agenda requires a longitudinal data set. Fortunately, such a data set exists for Britain: the *Annual Survey of Hours and Earnings* (ASHE) produced by the Office for National Statistics (ONS) and available from the UK Data Service (2013).<sup>8</sup> ASHE is a one per cent random sample drawn from National Insurance records and has been running since 2002 on its current basis which includes geographical details of workers' home addresses as well as workplaces. Survey forms are sent to their employers to complete rather than to the employees themselves, which results in more complete and accurate data than would otherwise be true. ASHE contains information for each individual relating to wages, hours of work, pension arrangements, occupation and industrial classifications, date of first employment by the current employer, sex and date of birth. Hence, it is possible to develop a time varying panel data set for a one percent sample of employees that permits one to determine if a worker changed residence during any particular year, and then to cross classify residential mobility with changes of workplace in that year or

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<sup>8</sup> There are other longitudinal data sets like the British Household Panel Study (now called 'Understanding Society') which do have the right variables but much smaller sample and a tendency to lose migrants through attrition.

in any succeeding year. Moreover, since ASHE provides the full postcode of work and residence, location can be recoded to a variety of geographies including rural-urban location and size of settlement. Hence, it is possible to distinguish between rural-urban, urban-rural, urban-urban and rural-rural migration (and commuting),<sup>9</sup> and GIS techniques can be used to measure both migration and commuting distances. This dataset permits us to directly examine whether migration from urban to rural, or within rural, results in longer distance commuting and whether urban-rural and/or rural-rural migrants adjust their workplace or their place of residence to reduce the commuting distance, as well as the time trend of any such adjustments.

While the ASHE has clear advantages for examining the interaction of migration and commuting over time, it also has some disadvantages. Foremost is the relative lack of social, economic, and demographic attributes collected for each respondent. In particular, previous research (see Champion et al., 2009, for a review) has shown that certain household-level characteristics – being the household reference person, living in a one-earner household, not being a female household reference person with a dependent child, having at least one car – are all associated with commuting longer distances. None of these variables can be examined in research using ASHE. This lack of compositional variables means that it is not possible to control for a number of important predictors of longer distance commuting. Nevertheless, it is possible to control for employment status, occupational skill level, industry, income, sex, and age, all of which have been shown to affect commuting distance.

The completeness and accuracy of ASHE data can also be affected by missing data for particular years when a person's employer did not comply fully with the data collection exercise, or when a person was unemployed, became self-employed or temporarily dropped out of the labor force. Accordingly, we

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<sup>9</sup> It can also be argued that identifying rural territory is an ambiguous enterprise in a highly urbanized nation such as England where settlements are relatively close together and few places are genuinely isolated from others. In other words, while urban places can be clearly delineated, rural is somewhat ambiguous. This poses a problem for research like this that proposes to examine geographic movements that link urban and rural.

minimize this problem by including all workers with records for the three years 2002, 2003 and 2006, regardless of whether they were present in 2004 and 2005. We limit the analysis to 2002-2006 because ONS reduced the ASHE sample by 20% during 2007 and 2008 to save money. These cuts were not random, in fact they were targeted to industrial sectors considered to have especially stable earnings. Hence, this could introduce a bias into our analyses because many of these establishments (and their workers) would have re-appeared in 2009.

Analytical strategy:

The annual series provided by the ASHE data set allows a direct determination of whether employees who move home over relatively long distances retain their previous place of work, or if they move either place of work or residence during any given year between 2002 and 2006. For the present study, those people who became long distance commuters between 2002 and 2003 are identified, and then these people are followed over a further 3 years to see whether they continued to be long-distance commuters over this period, i.e. what proportion of them had reverted to being short-distance commuters by 2006. The data set also permits the examination of sequences of moves. For example, one can look at those who became longer distance commuters as a result of a residential move between 2002 and 2003 and subsequently reverted to being a short-distance commuter and see how this was achieved, namely by a change of workplace, another change of home, or changes of both. In addition, the dataset enables one to differentiate the 'new' long-distance commuters by the route by which they became such; similarly, was it through a change of home address or a change of workplace address or changes of both? While ASHE contains data for the whole of Great Britain, the present analysis is restricted to England because the definitions of rural and urban are different in Scotland and Wales. We use a combination of cross tabulation (of migration status and commuting distance, for example), and

binomial logistic regression for a multivariate examination of univariate relationships revealed in the cross tabs.

Defining rural: Two separate classifications of urban and rural are used in this research. The primary measure is the Department of Environment, Food and Rural Affairs (DEFRA) typology of local authorities (LA). This classification provides a six way division of England between most urban to most rural (Rural Research Evidence Centre 2005). In this research as in Champion et al., (2009), rural England is defined as the three rural types in this classification. This permits a determination of whether migrants moved to rural areas from urban areas or from other rural areas. Secondly, the UK Census' classification of urban-rural context is used in some parts of the analysis. This scheme is based on precise measurements of physically built up area. All settlements with 10,000 or more residents are defined as urban; smaller areas are subdivided into towns, villages, and hamlets and isolated dwellings (Countryside Agency et al. 2004). However, unless otherwise stipulated, the DEFRA classification is used for basic operations such as extracting rural workers from the overall data set, examining urban-rural and rural-rural migration, etc.

Defining migrants and commuters: Since this analysis focuses on urban to rural and rural to rural migration of employed persons, it is limited to employed persons who worked outside of their home, and who resided in rural areas in 2003, the data set's second year. In this way, recent in-movers can be compared with employed rural residents who have lived at the same address for at least one year. The sample contains 26008 rural workers defined in this manner who are then disaggregated into migrants and stayers. Both migration and commuting distance are calculated as straight line distance.

Migration distance is between residential postcodes in 2002 and 2003 while commuting distance is between the residential and workplace postcodes in a particular year.<sup>10</sup>

Migrants are defined as workers who changed their residential post code between 2002 and 2003, where such moves were at least 5 km in distance. Migrants can originate in an urban area or in a different rural area. Workers who retain their same residential postcode between 2002 and 2003, or who moved less than 5 km, are considered 'stayers.' We make the 5km limitation in order to differentiate migrants from very local movers. Since the selected population is restricted to rural residents in 2003, migrants either originate in urban areas or come from other rural areas located at least 5 km from the current residence.

Commuters are defined as persons who work outside of their homes. They are disaggregated into longer distance commuters, 20km or more, and shorter distance ones, less than 20km. This threshold is based on an analysis of data on the distance travelled to work among rural workers in ASHE during 2003 (see below). While 20km may seem a modest commute, these data show that fewer than one quarter of rural England's working residents commute farther than this.<sup>11</sup>

## **Analysis**

### Commuting Distance of Recent Rural Migrants:

The first of our research questions relates to the distance that rural England's working residents (as of 2003) commute and, in particular, whether recent migrants – those who have moved home by at least 5km in the previous year – commute farther than rural workers who are stayers. Table 1 breaks down the sample of 26,008 working residents by their commuting distance type and migrant status, revealing

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<sup>10</sup> Residence and workplace post codes were assigned grid references, and then GIS was used to measure straight line distance between grid references.

<sup>11</sup> Data not shown here also show that that rural workers commute farther than their urban counterparts. Moreover, commuting distance is slightly greater in the most rural places.

that overall 23.2 pct are long distance commuters, and 7 pct are recent migrants. The cross classifications in the table show that commuting distance is positively associated with migration; about 1/3 of recent migrants are longer distance commuters compared with about 1 of 5 among stayers. Previous research (Boyle et al., 2001; Champion et al., 2009; Axisa et al., 2012) has demonstrated that migration has a positive association with commuting distance even after controlling for the effects of other personal and household attributes that are associated with commuting and migration.

(Table 1 here)

Table 1 also differentiates between urban-rural migrants and those who have moved from another part of rural England. This breakdown shows that both types of migrants are more likely to commute long distances compared with stayers, but urban-rural migrants are more likely to commute long distance than their rural-rural migrant counterparts. In addition, these data also *suggest* that many recent rural in-migrants revert from longer to shorter commutes after moving. This is especially true of urban-rural migrants where 56% are short distance commuters within one year of moving. Since their initial urban workplaces would most likely have been located 20 or more km from their new rural homes this *suggests* that a half or more of rural migrants who originated in urban areas became shorter distance commuters after moving. This would be consistent with previous research in Canada reported by Partridge et al., 2010.

As is well known from the literature, migration is a selective process. Accordingly, multivariate analysis is used to determine whether the positive relationship between recent rural migration and commuting distance holds up after allowing for the effects of other factors associated with personal and place characteristics. In the binomial logistic regression shown in table 2, the outcome is the probability of being a longer distance commuter compared with a shorter distance commuter. The outcome is a binary variable with commuting 20 or more km being coded as 1, and commuting less than 20 km being

coded as 0. The coefficients in table 2 are converted to odds ratios where any value above 1.0 is positive and values below 1.0 are negative (Hosmer and Lemeshow 1989). The analysis in table 2 shows that the relationship between migration and commuting distance persists in a multivariate analysis using the ASHE data. Workers who migrated from urban to rural areas between 2002 and 2003 are twice as likely to be longer distance commuters after their move compared with stayers in 2003, and rural to rural migrants are 1.3 times as likely.

(Table 2 here)

Table 2 also reveals that the associations between these factors and commuting distance are consistent with previous research using other data (Champion et al., 2009; Axisa et al., 2012). Prime working age migrants are more likely than younger or older workers to commute 20 or more km., males are more likely than females, and the highest paid workers and workers with high status occupations are much more likely to commute a long distance than workers who earn less or who work at less prestigious jobs. Workers residing in south-eastern England commute farther than workers residing in other regions and rural residents, especially those living in the most highly rural areas, commute farther than their more urbanized counterparts.

#### Persistence and Change of Commuting Distance:

The question about whether recent migrants are more likely to change their commuting distance type compared to stayers is examined in table 3 by cross classifying commuting distance type in 2003 by migration status and length of commuting in 2002, e.g., prior to migration.<sup>12</sup> These data show that migrants are substantially more likely to change their journey to work distance status than stayers. Over 96% of stayers who were shorter distance commuters (SDC) in 2002 remained so in 2003

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<sup>12</sup> In this and subsequent tables we use the abbreviation SDC to stand for shorter distance commuter (< 20km), and LDC to stand for longer distance commuter (20+ km).

compared with only 73% of migrants who were originally SDC. Similarly, while almost 90% of stayers who were longer distance commuters (LDC) in 2002 remained so in 2003, the same is true of only 52% of migrants. Interestingly, the data show that about half of migrants who were LDC before their moves remained so at the end of the year of their moves, regardless of whether they moved from urban to rural or from one rural place to another. In contrast, while about 73% of all migrants who were SDC prior to moving remain so in 2003, the same is true of only 60% of those moving from urban areas. Thus, importantly, four out of ten urban to rural migrants who were initially short distance commuters switched to longer commutes after moving. This suggests that a substantial share of workers who move from urban to rural areas may commute back to their urban jobs. In contrast, over eighty percent of rural to rural migrants who were initially short distance commuters remain so after moving to a different rural area.

(Table 3 here)

Having examined persistence and change of commuting distance one year after migration to or within the rural sector, we now examine persistence and change over a four year period, 2002-2006 (last two columns of table 3). Similar to the initial post-migration period, both migrants and stayers who began as SDC are more likely to retain that status than workers who began as LDC. Among migrants, the 4 year results are almost exactly the same as the one year results. Three quarters of recent rural migrants who began as SDC in 2002 are still SDC in 2006 while 51% of migrants who were originally LDC persisted in that state. Again, this means that almost half of migrants who were LDC prior to moving reduced their commuting distance (i.e. to the extent of becoming SDC) within three years. It also appears that almost all of this change occurred within the first year (i.e. during the year in which they moved home). Similarly, the four year results among urban-rural and rural-rural migrants are very similar to those described above for 2002-2003. To the extent that migrants change their commuting

distance status, such changes occur during the year of their home moving regardless of whether workers move from urban to rural or from one rural place to another.<sup>13</sup>

#### Persistence and Change of Longer Distance Commuting Status Among Recent Migrants, 2002-2006:

This section examines the extent to which *workers who were or became LDCs in 2003* retain that commuting distance status 3 years later in 2006. In particular the focus is on the recent rural migrant population. Is the residential move in 2002-2003 that results in a worker being a LDC in 2003 followed by a later adjustment of home [or workplace] that brings the distance of commute down below 20km, or is LDC status a more permanent feature of behavior lasting at least 3 years? Does this vary between those who were already LDC prior to their 2002-2003 move compared with workers who switched from SDC to LDC during the year they moved? The data in Table 4 shed light on this question. First, 73% of the 6031 ASHE workers who were or became LDC in 2003 remained LDC in 2006 and 27% became SDC. Of the 636 workers who moved to or within rural during 2002-2003 and were LDC the year following their move, 438 (68.9%) retained that commuting distance status in 2006. Moreover, this degree of persistence does not vary by whether migrating workers originated in an urban area or elsewhere in rural England. LDC persistence over 3 years is slightly stronger among stayers who were LDC in 2003 (73.5% vs. 68.9%), although the stayer population as defined here includes some workers who moved residence before 2002 and who might still be adjusting.

(Table 4 here)

Another way of examining persistence of long distance commuting status among recent rural in-migrants is to see how many who persisted in LDC status over 2003-2006 had already been LDC in 2002 before their move and, as a corollary, how many of those who switched from LDC to SDC during 2003-2006 were reverting to their previous SDC behavior, with both thereby not causing any long-term

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<sup>13</sup> The time of change in commuting distance status appears to be simultaneous with the year of moving home as far as we can tell from our annual observations.

increase in aggregate commuting travel – at least not in terms of the binary distinction between SDC and LDC being used in the present study. The data in Table 5 provide a breakdown of the people who were LDC in 2003 by whether they were LDC or SDC in 2002 and 2006. We have characterized these situations as ‘revert’, e.g., returning to SDC after being LDC. Workers can revert to SDC in 2006 after being LDC in both 2002 and 2003 (L-L-S), or after becoming LDC between 2002 and 2003 (S-L-S). Workers who kept LDC status after first attaining it in 2003 are characterized as ‘retain’. Finally, workers who were LDC in 2002, 2003 and 2006 are characterized as ‘maintain’.

(Table 5 here)

As can be seen across the first row of table 5, about 65% of workers who were LDC in 2003 were also LDC in 2002 and 2006 (LLL). Only 8% became LDC in 2003 and retained this status in 2006 (SLL). Slightly over one quarter of workers who were LDC in 2003 reverted to SDC status, 8.6% after becoming LDC in 2003 (SLS), and the other 18.5% accounted for by workers who were LDC in 2002 and 2003 (LLS). The distribution of recent rural migrants across these four categories of change in commuting distance is quite different than that of all ASHE workers (and of course of stayers). About 1 in 5 recent migrants, both urban-rural and rural-rural, who originated as SDC in 2002 and became LDC in 2003, reverted to shorter distance commuting by 2006 (SLS). This suggests that many may have found the longer commute displeasing and switched back to what they likely experienced prior to leaving their previous residences. In contrast, migrants who became LDC in 2003 as a result of their move to or within rural England are much more likely than rural stayers who became LDCs in 2003 to retain this status in 2006 (S-L-L). In fact, about 1/3 of workers who migrated to or within rural England between 2002 and 2003 and were LDC in 2003 retained that status for at least 3 years (S-L-L); substantially higher for urban-rural migrants than for rural-rural migrants. In contrast, only 5% of stayers who were LDC in 2003 retained this status 3 years later.

The analysis in Table 6 examines another aspect of the study's second question, and in particular the characteristics of workers that are associated with retaining longer commuting distance status among those who commuted that distance in 2003. The analysis is limited to workers who were LDC in 2002 or became LDC in 2003. The binomial logistic regression examines the odds of workers with particular attributes retaining LDC status three years later in 2006.<sup>14</sup>As was true in table 2, the coefficients are odds ratios with values of 1.0 or higher indicating positive associations with retaining LDC between 2003 and 2006. Predictors are all coded as categorical variables with reference categories indicated in italics.

(Table 6 here)

The most striking finding is that workers who were already LDC in 2002 have over the three times the odds of retaining LDC status in 2006 compared with those who were SDC in 2002 before becoming LDC in 2003. In examining the rest of table 6 it is helpful to remember what was shown in table 2 where factors associated with *being* LDC in 2003 were examined. The effect of migration is similar in both analyses. Migrants are somewhat more likely to be and to remain LDC than stayers, and urban-rural migrants are slightly more likely to retain LDC status than workers who moved within rural England.<sup>15</sup> Age holds some effect, in that 16-29 year olds had substantially lower odds of remaining LDC in 2006 compared with the reference case of 30-44 year olds. Older age groups are slightly more likely than 30-44 year olds to retain LDC status, but these coefficients are only significant at the .05 level. This pattern of results differs from the impact of age on the likelihood of being LDC in 2003 as shown in table 2. In that analysis, only 45-59 was significant in comparison with 30-44, and the association was negative.

Similar to the results shown in table 2 which estimated the likelihood of being LDC in 2003, men are much more likely to remain long distance commuter status than women, as are highly paid workers

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<sup>14</sup> The N is 6029. Two records were deleted because they lacked information on economic sector.

<sup>15</sup> Slightly stronger in terms of both the odds ratio and the level of statistical significance.

and higher level professionals. The effect of pay level is especially strong, with the odds of remaining LDC falling with declining pay and with even the second highest quintile being significantly different from the top quintile. High wage workers who migrated to or within rural England between 2002-2003 are strongly committed to their original workplace, and are hesitant to relinquish such jobs, even if this means a long journey to work. It appears that upper level professionals and managers with high pay who have long journeys to work have a career long attachment to long distance commuting. Well paid people have the resources to obtain high quality of life in rural areas, and they appear to be willing to commute relatively long distances to both retain their pay level and enjoy an amenity-rich residential community.

The rural-urban and regional locations of a worker's current residence are only weakly associated with retention of LDC status. This is substantially different than the pattern of results displayed earlier in table 2 where the likelihood of being a LDC in 2003 increased directly as one moved down the urban hierarchy, and where workers living in the SE of England were more likely to travel longer distances to their work. The effect of residence on LDC retention between 2003 and 2006 shows that workers who live in the most highly rural areas are only slightly more likely to remain LDC than workers living in larger settlements and/or less isolated rural environs.

#### Pathways to Changed Commuting Distance:

The analysis in table 7 examines the paper's final research question, namely whether workers residing in rural areas in 2003 who were LDC in 2003 changed their commuting distance status between 2003 and 2006, and if so whether they accomplished this by changing their workplace, their residence (again) or both. Examining the first column of table 7 shows that about 27% of workers who were or became LDC in 2003 switched to SDC three years later (1630/6031). Recent rural migrants, both to and within rural, were somewhat more likely to switch from LDC to SDC (about 31%). As might be expected, switching workplace or residence is more common among workers who switched their commuting

distance status than those who remained LDC from 2003-2006. Among workers who switched from LDC to SDC, 87% changed their workplace or both their workplace and residence during this time, 54% and 33% respectively. This mobility is somewhat lower among rural-rural migrants, but still exceeds three quarters. A surprising finding revealed in this table is the high degree of both residential and workplace mobility, especially the latter, that has occurred among ASHE workers regardless of whether they changed their commuting distance status or not. The second column of table 7 shows that between 50% and 60% of workers who retained their LDC status between 2003-2006 changed their workplace or residence during this period. This is especially notable among urban-rural migrants who were LDC in both 2003 and 2006 -- almost 60 percent changed either residence, workplace or both.

(Table 7 here)

The analysis in table 7 shows that changing commuting type status is most often accomplished by changing the location of work. In addition, the analysis also showed that a high degree of both residential and especially workplace mobility occurred among ASHE workers regardless of whether they changed their commuting distance status or not. In other words, English workers move around a lot, but these moves of residence or/and workplace often cancel each other out, hence failing to significantly alter the distribution of commuting length over time, at least over the four years studied here.

### **Conclusions**

This study revisited previous research on internal migration and commuting distance and has confirmed the strong positive relationship between the two. Moreover, it has greatly enhanced knowledge of the migration-commuting nexus by examining questions that were not possible to investigate in previous cross sectional research. In particular, we examined persistence and change of commuting distance status, the time trend of adjustments of commuting distance, and their associations with recent rural migration and other socioeconomic attributes of English workers.

Developing longitudinal research on the migration-commuting nexus contributes to a theoretically-shaped and evidence-based framework for understanding the evolving structure of labor markets and regions. In particular, this study directly examined stability and change in commuting distance among rural in-migrants over a 4 year period from 2002 through 2006. We showed that English labor markets, especially during a period of net urban to rural migration, are characterized by a significant amount of long distance commuting (23% of all workers); that this situation is particularly prevalent among rural in-migrants; and that long distance commuting is not necessarily a transitory condition among workers who return to short distance commuting over the near or medium term. We showed that for many workers long distance commuting is a relatively stable feature throughout their careers. This is especially true of male workers, and workers in more highly paid occupations. These persons are more likely to commute longer distances, and they are more likely to maintain longer journeys to work regardless of their migration status.

A particular interest was whether rural migrants retain their original workplaces after moving, or bring work closer to home as a result of changing the location of their work, making a further house move, or both. We showed that about three quarters of migrants who were initially shorter distance commuters retained that status after moving to or within rural areas. In contrast, almost half of all migrants who were initially longer distance commuters reduced their commuting distance type subsequent to migrating. While our research showed that migration to or within rural areas often results in changed commuting distance, the likelihood of this occurring is contingent on commuting distance prior to moving, and also on migrants' occupational and income levels. In particular, higher status workers who move to or among rural areas appear resistant to changing employment simply to reduce their commuting distance. Hence, those who were longer distance commuters prior to migrating tend to retain that status, while those who had shorter distance commutes increase their journey to work in order to enjoy rural amenities and lifestyle.

Associations between migration, commuting distance, and persistence or change therein, held for both rural-rural and urban-rural migrants, but were especially strong in the latter case. We believe that this has significant implications for understanding the dynamic nature of the urban-rural interface. Rather than separating cities and their interdependent rural populations, our research suggests that internal migration and commuting contribute to regional integration that blurs the boundary between cities and their peripheries. Hence, the lens of population mobility is an effective vantage point for examining the production and reproduction of social and economic structures that constitute the urban-rural interface (See also Partridge et al., (2010) for a discussion of this point). From this perspective, the rural-urban interface can be understood as an extensive geographic space that is given meaning by the interactions, demographic and otherwise, that take place within it.

As Lichter and Brown (2011) noted, the growing interpenetration of urban and rural life involves a diverse set of cultural, economic, social, political and environmental transactions, but none is more visible than the movement of population and workers within the urban-rural interface. The argument presented here is that by examining migration and commuting that either originates in or is destined for an urban area, we can understand one aspect of how cities interact with their surrounding peripheries. Hence, it is argued that examining migration and commuting is an inductive approach toward understanding the structure of urban regions because the rural-urban interface is at least partly defined by the migration and commuting that takes place within it.

There is a long tradition in urban and regional studies of seeing urban-rural migration as a decentralizing force, but the social and economic results of such decentralization are diminished to the extent that urban-rural migrants commute back to city jobs. Hence, rather than polarizing the rural and urban parts of labor markets and regions, the net effect of internal migration and commuting may actually heighten socio-demographic and economic integration between rural and urban spaces. The present analysis sheds light on how urban-rural migration and commuting produce and reproduce one

aspect of the urban-rural interface. This perspective is consistent with Shucksmith's (2014:4) observation that "Place is understood as a social construct, continually co-produced and contested, and connected to other places through relational reach rather than by mere geographic proximity."

Studies of the urban-rural interface are often shaped by notions of urban dominance (Duncan et al., 1960). However, our research suggests that the distribution of power in rural-urban relationships may be more symmetric. Rather than starting with preconceived notions of urban dominance and rural dependency, we propose that researchers let the social and economic life that occurs within the interface define the nature of urban-rural relationships and how they change over time. While it is undeniably true that rural residents depend on urban labor markets for employment, specialized services and cultural activities, it also seems clear that the perceived amenities and quality of life associated with rural residence are sufficiently attractive to many professionals and managers to justify relatively long commutes.

The migration/commuting nexus examined in this study is strongly associated with the economic security of English workers and with the labor supply available in English labor markets. As such, it is an important aspect of the nation's evolving spatial economy. In addition, urban to rural and rural to rural migration and commuting may also affect other aspects of rural and urban life over and above employment (Findlay et al 2001; Shields & Deller 1998). Migration is conventionally defined as a change of usual residence of sufficient distance and duration to interrupt migrants' daily activities (Long 1988). Hence, many scholars tend to assume that rural migration contributes to a separation of rural and urban economy and community. But, research in the UK and in other developed nations that have experienced net urban-rural migration for at least some period of time has yet to establish the extent to which residential relocation of this type fundamentally alters migrants' social and economic life, or whether in-migrants continue to obtain services from the same urban-based professionals, socialize with friends and family in origin communities, and/or participate in urban civic life. For example, a

recent study of German, Belgian and French residents working in Luxembourg estimated that these households spend almost a billion euros per annum in Luxembourg, reflecting about 10% to their total household final consumption expenditure (Thomas et al., 2014). Our examination of the commuting behavior of migrants to and within rural England indicates the extent to which such migration may rearrange the spatial pattern of migrants' daily work lives. Strong evidence of "back commuting," for example, is consistent with a conclusion that urban to rural migration is less disruptive of urban community structure than would appear to be true given the residential redistribution resulting from urban to rural migration in the UK.

On the other hand, rural-urban migration and commuting may have deleterious environmental and social impacts. As shown in this study, a significant share of rural in-migrants become and remain longer distance commuters which means more workers traveling on the road for longer distances and a consequent increase in the nation's carbon footprint. Moreover, a recent study by ONS (2014) showed that longer distance commuting is associated with lower life satisfaction and anxiety. Clearly, further research on the economic, social and environmental impacts of longer distance commuting is warranted.

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**Table 1: Rural Residents in Work, by Migrant Status and Commuting Distance, 2003**

	All Commuters		Short Distance (SDC)		Long Distance (LDC)	
	Number	%	Number	% all	Number	% all
Rural residents in work	26,008	100.0	19977	76.8	6031	23.2
Migrant status						
Stayers	24,186	93.0	18791	77.7	5395	22.3
Migrants	1,822	7.0	1186	65.1	636	34.9
Migrants	1,822	100.0	1186	65.1	636	34.9
Urban-rural	717	39.3	403	56.2	314	43.8
Rural-rural	1105	60.6	783	70.9	322	29.1

Note: The population comprises all ASHE members living in rural England in 2003 and with records in 2002, 2003 and 2006. Long distance refers to 20km or more.

Source: calculated from ASHE.

**Table 2: Factors associated with the propensity of rural England's residents to commute 20km or more, for those with ASHE records in 2002, 2003 and 2006**

Characteristic	B	S.E.	Sig.	Exp(B)
<i>Non-migrant</i>				
Urban-rural migrant	.709	.082	.000	2.033
Rural-rural migrant	.276	.073	.000	1.317
<i>Aged 30-44</i>				
16-29	.102	.049	.037	1.107
45-59	-.242	.035	.000	.785
60+	-.095	.092	.302	.909
<i>Male</i>				
Female	-.340	.037	.000	.712
<i>Full-time employee</i>				
Part-time employee	.002	.064	.980	1.002
<i>Top (gross weekly) pay quintile</i>				
Second pay quintile	-.428	.045	.000	.652
Third pay quintile	-.904	.051	.000	.405
Fourth pay quintile	-1.318	.061	.000	.268
Bottom pay quintile	-1.351	.083	.000	.259
<i>Higher professional/managerial</i>				
Lower professional/managerial	-.127	.046	.006	.881
Intermediate occupation	-.208	.053	.000	.812
Low skill occupation	-.670	.052	.000	.512
<i>Working in non-primary sectors</i>				
Primary sector	-1.070	.189	.000	.343
<i>Living in south-eastern England</i>				
Not in south-eastern England	-.241	.032	.000	.786
<i>Living in urban area with 10K+ inhabs.</i>				
Town/fringe	.115	.041	.005	1.122
Village	.224	.044	.000	1.251
Hamlet & isolated dwelling	.282	.064	.000	1.326
<i>Significantly Rural LA (least rural)</i>				
Rural-50 LA	.161	.040	.000	1.175
Living in Rural-80 LA (most rural)	.072	.038	.063	1.074

Notes: Table shows the odds of commuting 20km or more compared to the reference case (odds=1.000) for each variable (shown in italics). South-eastern England comprises London, South East, and East of England Government Office Regions. Significance levels: \*\*\* 0.001, \*\* 0.01, \* 0.05. N=25,995, i.e. excluding 13 cases with data missing for economic sector. Nagelkerke R Square = 0.159.

Source: calculated from ASHE.

**Table 3: Persistence and Change of Commuting Type by Migrant Status and Length of Original Commute, Rural England, 2002-2006**

Migrant status 2002-03	DC type 2002	All	LDC 2003	LDC 2006	%SDC 2003	%LDC 2003	%SDC 2006	%LDC 2006
Stayer	All	24186	5395	5441	77.7	22.3	77.5	22.5
	SDC	18867	670	1653	96.4	3.6	91.2	8.8
	LDC	5319	4725	3788	11.2	88.8	28.8	71.2
Migrant	All	1822	636	598	65.1	34.9	67.2	32.8
	SDC	1242	336	300	72.9	27.1	75.8	24.2
	LDC	580	300	298	48.3	51.7	48.6	51.4
Urban-rural migrant	All	717	314	286	56.2	43.8	60.1	39.9
	SDC	487	194	167	60.2	39.8	65.7	34.3
	LDC	230	120	119	47.8	52.2	48.3	51.7
Rural-rural migrant	All	1105	322	312	70.9	29.1	71.8	28.2
	SDC	755	142	133	81.2	18.8	82.4	17.6
	LDC	350	180	179	48.6	51.4	48.9	51.1

Note & source: See Table 1.

**Table 4: Persistence of Long Distance Commuting Status by Migration Status, 2002-2006**

Migrant type 2002-2003	LDC in 2003		Still LDC in 2006	
	N	% of total	N	% of 2003
Total	6031	100.0	4401	73.0
Stayer	5395	89.5	3963	73.5
Migrant	636	10.5	438	68.9
Urban-rural migrant	314	5.2	214	68.2
Rural-rural migrant	322	5.3	224	69.6

Note & source: See Table 1.

**Table 5: Long distance commuters 2003, for two groups of migrants, by whether LDC or SDC in 2002 and 2006**

Migrant type 2002-2003	Commute type 2002-2003-2006 respectively				
	Revert		Retain	Maintain	Total
	S-L-S	L-L-S	S-L-L	L-L-L	
All LDC in 2003					
N	516	1114	490	3911	6031
% of total	8.6	18.5	8.1	64.8	100.0
Stayers					
N	386	1046	283	3674	5395
% of total	7.2	19.4	5.2	68.1	100.0
Migrants					
N	130	68	206	232	636
% of total	20.4	10.7	32.4	36.5	100.0
Urban-rural migrants					
N	69	31	125	89	314
% of total	22.0	9.9	39.8	28.3	100.0
Rural-rural migrants					
N	61	37	81	143	322
% of total	18.9	11.5	25.2	44.4	100.0

Note: The population comprises the 6,031 ASHE members who were living in rural England in 2003, had records in 2002, 2003 and 2006, and were long distance commuters (20m or more) in 2003. L = long distance commuter, S = short distance commuter.

Source: calculated from ASHE.

**Table 6: Modelling the propensity of rural England's residents who were long distance commuters (LDC) in 2003 to retain LDC status in 2006**

Characteristic	B	S.E.	Sig.	Exp(B)
<i>SDC in 2002</i>				
LDC in 2002	1.138	.083	.000	3.121
<i>Stayer</i>				
Rural-rural migrant	.293	.142	.040	1.340
Urban-rural migrant	.374	.145	.010	1.454
<i>Aged 30-44</i>				
16-29	-.398	.090	.000	.672
45-59	.170	.072	.019	1.185
60+	.441	.200	.027	1.554
<i>Male</i>				
Female	-.355	.073	.000	.701
<i>Full-time employee</i>				
Part-time employee	.538	.134	.000	1.712
<i>Top (gross weekly) pay quintile</i>				
Second pay quintile	-.339	.092	.000	.712
Third pay quintile	-.647	.105	.000	.524
Fourth pay quintile	-1.118	.122	.000	.327
Bottom pay quintile	-1.855	.167	.000	.157
<i>Higher professional/managerial</i>				
Lower professional/managerial	-.194	.095	.042	.824
Intermediate occupation	-.268	.106	.011	.765
Low skill occupation	-.321	.107	.003	.726
<i>Working in non-primary sectors</i>				
Primary sector	-.055	.439	.901	.947
<i>Living in south-eastern England</i>				
Not in south-eastern England	-.073	.065	.262	.930
<i>Living in urban area with 10K+ inhabs.</i>				
Town/fringe	.077	.084	.360	1.080
Village	.185	.092	.044	1.203
Hamlet & isolated dwelling	-.004	.126	.976	.996
<i>Significantly Rural LA (least rural)</i>				
Rural-50 LA	.064	.078	.412	1.066
Living in Rural-80 LA (most rural)	.133	.082	.104	1.142

Notes and source: See Table 2. N = 6,029, i.e. excluding 2 cases with data missing for economic sector. Nagelkerke R Square = 0.191

**Table 7: Long distance commuters 2003, for two groups of migrants, by change of LDC/SDC status 2003-2006, by combinations of change of residence (R) and change of workplace (W)**

Migrant type 2002-2003 and commuting distance type combination	LDC in 2003	No change of R or W	Changed R only	Changed W only	Changed both R and W
<b>Urban-rural migrants</b>					
LDC in 2003, of whom:	314	28.3	14.6	27.7	29.3
Still LDC also in 2006	214	41.6	14.0	26.2	18.2
Switched to SDC 2006	100	0.0	16.0	31.0	53.0
<b>Rural-rural migrants</b>					
LDC in 2003, of whom:	322	34.8	14.0	24.2	27.0
Still LDC also in 2006	224	50.0	9.8	23.7	16.5
Switched to SDC 2006	98	0.0	23.5	25.5	51.0
<b>Non-migrants</b>					
LDC in 2003, of whom:	5395	36.8	11.0	35.9	16.2
Still LDC also in 2006	3963	50.1	10.8	28.1	11.0
Switched to SDC 2006	1432	0.0	11.6	57.6	30.8
<b>All LDC in 2003</b>					
LDC in 2003, of whom:	6031	36.3	11.4	34.9	17.5
Still LDC also in 2006	4401	49.7	10.9	27.7	11.6
Switched to SDC 2006	1630	0.0	12.6	54.0	33.4

Notes and source: see Table 5.